



88015334

## FINAL REPORT

# Assessment of Geology, Energy, and Minerals (GEM) Resources

## SOUTH BRUNEAU RIVER GEM RESOURCE AREA

(ID-010-07)

OWYHEE COUNTY, IDAHO

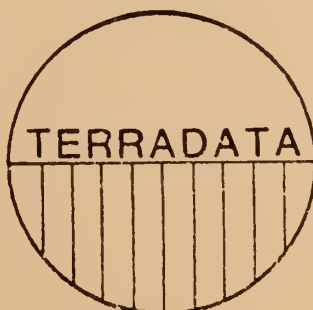
Prepared for

United States Department of the Interior  
United States Bureau of Land Management  
Scientific Systems Development Branch

March 1983

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Assessment of  
Geology, Energy, and Minerals (GEM)  
Resources

South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho

Prepared For:

United States Department of the Interior  
United States Bureau of Land Management  
Scientific Systems Development Branch

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This report was prepared as part of a Phase I Assessment of GEM  
Resources within designated Wilderness Study Areas in Oregon, Idaho and  
Nevada.

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- o Dr. Antonius Budding - Oil Shale and Tar Sands
- o Mr. Raymond Corcoran - Field Verification
- o Dr. James Firby - Paleontology
- o Mr. Ralph Mason - Coal
- o Mr. Richard Miller - Uranium and Thorium
- o Mr. Vernon Newton - Oil and Gas
- o Mr. Herbert Schlicker - Industrial Minerals and Geologic Hazards
- o Dr. Walter Youngquist - Geothermal
- o Dr. Paul Weis - Metals and Non - Metals.

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Ms. Pamela Ruhl provided clerical and editorial assistance throughout the project. Ms. Sara Mathews assisted with occurrence information and drafting. Mr. Philip R. Jones and Mr. Michael A. Becker produced all documents relating to the project using TERRADATA's word processing and document production systems.







## EXECUTIVE SUMMARY

The purpose of this project is to evaluate and classify environments favorable for the occurrence of geology, energy, and minerals (GEM) resources in selected wilderness study areas (WSAs) in southeastern Oregon, southwestern Idaho, and northern Nevada. (See **TERRADATA report entitled "Procedures for the Assessment of Geology, Energy, and Minerals (GEM) Resources."**) GEM resource environments have been rated on a scale that ranges from one to four, with one being least favorable and four being most favorable. Favorability classes two and three represent low and moderate favorability, respectively. Confidence levels range from A to D with A being low confidence and D being high confidence. The confidence levels are directly related to the quantity and quality of the information available for the determination of the favorability classes.

The specific area with which this report deals is the South Bruneau River GRA (GRA number (ID - 010 - 07) which is located in southwestern Idaho (see location map below). The GRA contains about 648 square miles within Townships 12S through 16S and Ranges 4E through 9E. It contains three WSAs that have a combined area of 92,080 acres. These are WSAs 17-11 (75,340 acres), WSA 111-36A (11,680 acres), and WSA 111-36B (5,060 acres). The study area is in the Bruneau and Jarbidge Resource Areas of the Boise BLM District.

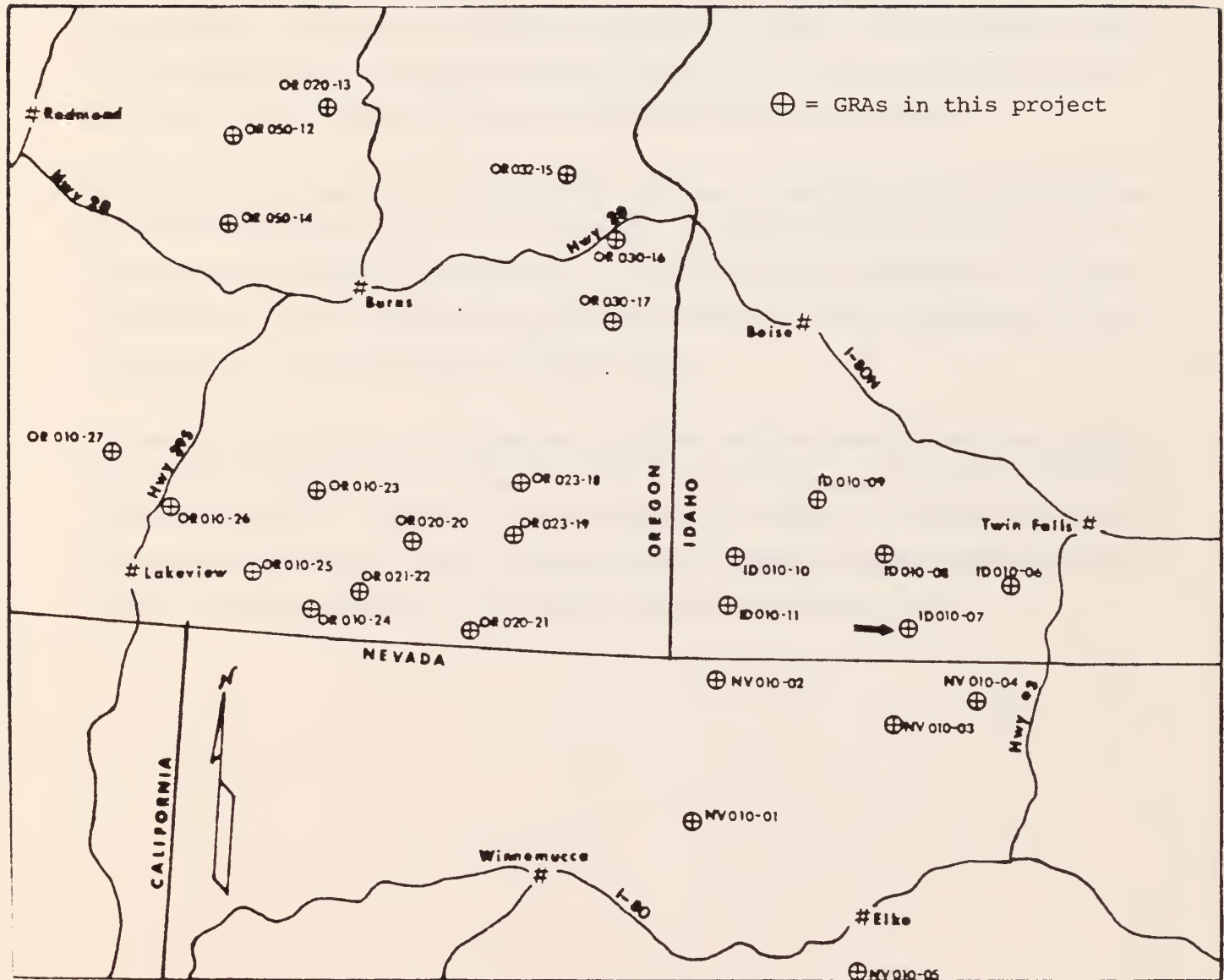
The GRA is within the Owyhee Upland sub-province of the Columbia Intermontane physiographic province. Rocks exposed in the GRA are all Tertiary or younger volcanic flows, domes, and related volcanoclastic sedimentary strata. Limited exposures of Miocene lacustrine units also occur within the GRA. The area is located on or near the axis of the Devonian Antler orogenic belt. Basin and Range block-faulting is not apparent in the area because of the thick mantle of Tertiary and Quaternary volcanics. The South Bruneau River GRA is not near any known mineral belts or mining districts. Historically, the area has had no significant production of any GEM resources.

The geologic environments and inferred geologic processes indicate no favorability for the accumulation of most GEM resources. The nature of the available data and the geometry of potential geologic environments do not permit subdivision of the GRA into commodity-specific areas of favorability, except in the case of geothermal resources.





# GRA Location Map





The South Bruneau River GRA contains one environment that is moderately favorable (Class 3A) for the occurrence of geothermal resources. Two subareas are classified 3A for potential geothermal resources in accordance with the BLM classification scheme (Land Classification Table, below); the geologic environment, the inferred geologic processes, and known occurrences indicate a moderate favorability for the occurrence of this resource. Geothermal occurrences exist within the GRA. The low confidence level (A) is assigned to this evaluation because the temperatures in the known occurrences may be less than those necessary for the commercial production of electricity.

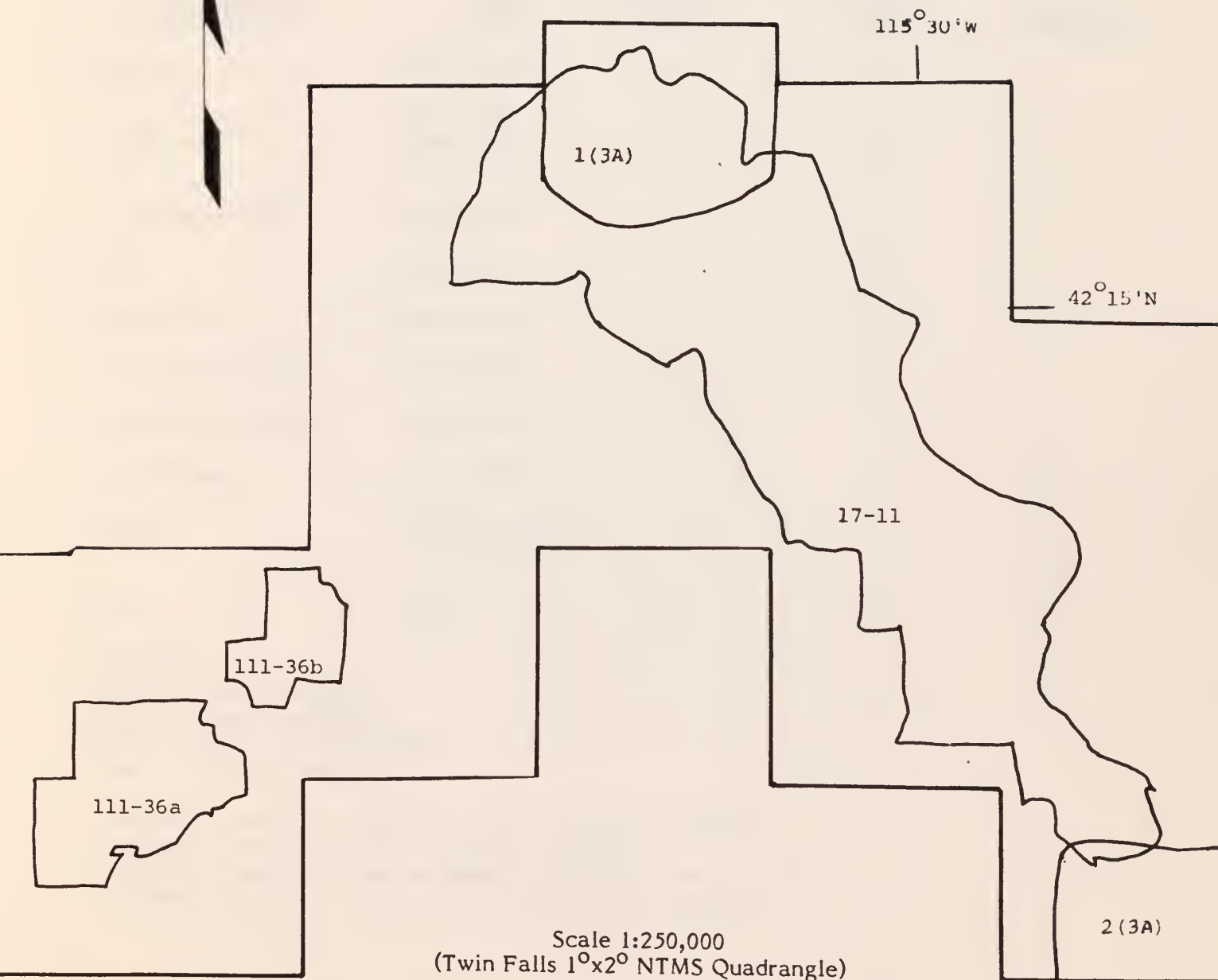
Favorable environments for all other GEM resources do not exist in the South Bruneau River GRA. Classification of the area for all other commodities is 1A, 1B, or 1C. This signifies that the geologic environments and inferred geologic processes do not indicate favorability for the accumulation of other GEM resources. These classifications all have relatively low to moderately high confidence levels.

Further surface geologic investigations, including detailed mapping and stratigraphic studies, could enhance the confidence levels of many of the classifications in the South Bruneau River GRA. Sub-surface investigations are probably not warranted in this area due to the costly nature of the available methods. Geophysical and geochemical surveys might provide some insight into the potential resources in the study area.



Land Classification Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho

N







**Classification Of Lands Within The  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho  
For GEM Resource Potential**

<u>COMMODITY</u>	<u>AREA</u>	<u>CLASSIFICATION LEVEL</u>	<u>CONFIDENCE LEVEL</u>	<u>REMARKS</u>
Metals	Entire GRA	1	B	
Geothermal	Area 1-3A	3	A	
	Area 2-3A	3	A	
	Rest of GRA	1	B	
Uranium/Thorium	Entire GRA	1	A	
Coal	Entire GRA	1	C	
Oil and Gas	Entire GRA	1	B	
Tar Sands/Oil Shale	Entire GRA	1	C	
All Industrial Minerals	Entire GRA	1	A	
Paleontology	Entire GRA	1	A	
Hazards	See Hazards Map (GRA File)			
ESLs	None	1	C	

**LEGEND:**

Class 1 - Least Favorable  
Class 2 - Low Favorability  
Class 3 - Moderate Favorability  
Class 4 - High Favorability

Confidence Level A - Insufficient data or no direct evidence  
Confidence Level B - Indirect evidence available  
Confidence Level C - Direct evidence but quantitatively minimal  
Confidence Level D - Abundant direct and indirect evidence





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## 1. INTRODUCTION

This report is one of 27 GRA technical reports that summarize the results of a Phase I assessment of the geology, energy, and minerals (GEM) resources in selected portions of southeastern Oregon, southwestern Idaho, and northern Nevada. The study region was subdivided into 27 GEM resource areas (GRAs), principally for ease of data management and interpretation. The assessment of GEM resources for this project consisted of an interpretation of existing literature and information by experts knowledgeable in both the geographic area and specific commodities. It is possible that the assessment would be different if detailed field exploration, geochemical sampling, and exploratory drilling programs were undertaken. (See the TERRADATA report entitled "Procedures for the Assessment of Geology, Energy, and Minerals (GEM) Resources.")

This report summarizes the assessment of the GEM resources potential of the South Bruneau River GRA (ID-010-07). See Figure 1-1. Commodity categories for which this GRA was evaluated are:

- o Metals
- o Oil and Gas
- o Oil Shale and Tar Sands
- o Geothermal
- o Uranium and Thorium
- o Coal
- o Industrial Minerals
- o Paleontological Resources
- o Geologic Hazards
- o Educational and Scientific Localities (ESLs)

Geologic environments within the South Bruneau River GRA have been rated with respect to their favorability for the occurrence of these different commodities. The favorability rating scale ranges from one to four, with one being least favorable and four being most favorable. Confidence levels in these ratings also have been assigned. These confidence levels range from A to D, with A being low confidence and D high confidence.

Assigned confidence levels are related to the quantity and quality of the information available for the determination of the favorability ratings.









## 2. DESCRIPTION OF THE SOUTH BRUNEAU RIVER GRA

### 2.1 LOCATION

The South Bruneau River GRA (ID-010-07) is in southwest Idaho. It lies between latitudes 42°00'N and 42°20'N and longitudes 115°21'W and 116°00'W. The GRA contains approximately 648 square miles within Townships 12S through 16S and ranges 4E through 9E (see Figures 1-1 and 2-1). The area contains three Wilderness Study Areas; WSA 17-11 (75,340 acres), WSA 111-36A (11,680 acres), and WSA 111-36B (5,060 acres). The South Bruneau River GRA is in the Bruneau and Jarbidge Resource Areas of the Boise BLM District. The area is about 80 miles from Twin Falls, Idaho, which is the nearest transportation center offering a minimum of rail, highway, and/or charter-air services. Access to the contained WSAs is via county maintained dirt or packed-gravel roads. Vehicular access to the interior of the WSAs is poor to non-existent.

### 2.2 GENERAL GEOLOGY

The South Bruneau River GRA is in the Twin Falls 1°x2° NTMS quadrangle map in the southwest corner of Idaho. The data available for this area includes NURE investigations<sup>(1,2,3,4)\*</sup>, general mineral resource information<sup>(5)</sup>, and limited small scale geologic mapping<sup>(6)</sup>. Reconnaissance geologic mapping (scale 1:62,000), magnetic and gravity maps, and geochemical data are available for areas west of the GRA<sup>(7)</sup>. Resource and geologic information for the South Bruneau River GRA are poor, compared with other GRAs.

The South Bruneau River GRA is within the Owyhee Upland sub-province of the Columbia Intermontane physiographic province<sup>(8)</sup>. The Owyhee Upland is a plateau and mountainous region in northern-most Nevada, southwest Idaho, and southeast Oregon. The Owyhee Upland sub-province is separated from the Great Basin by a major drainage divide located south of the GRA in Nevada. The area is bounded on the north by the High Lava Plains (Snake River Plain) sub-province of the Columbia Intermontane province. Tertiary rhyolites, andesites, and basalts are the oldest rocks exposed in the GRA. The youngest rocks are Bruneau Formation fan gravels (Figure 2-2).

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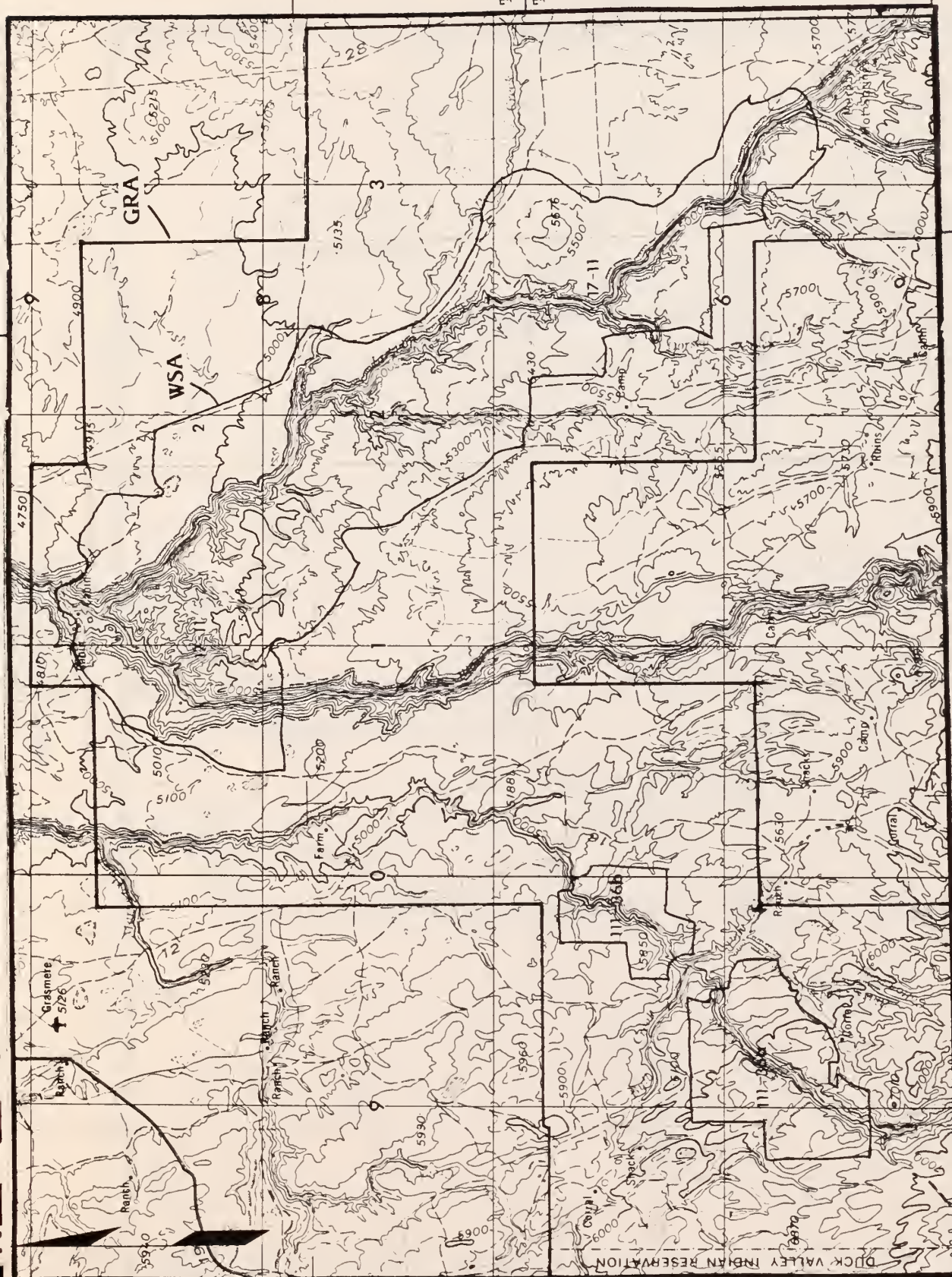
\* In this report, citations are superscripted numbers. They refer to bibliographic entries listed in Appendix A: References Cited.







Topographic Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho



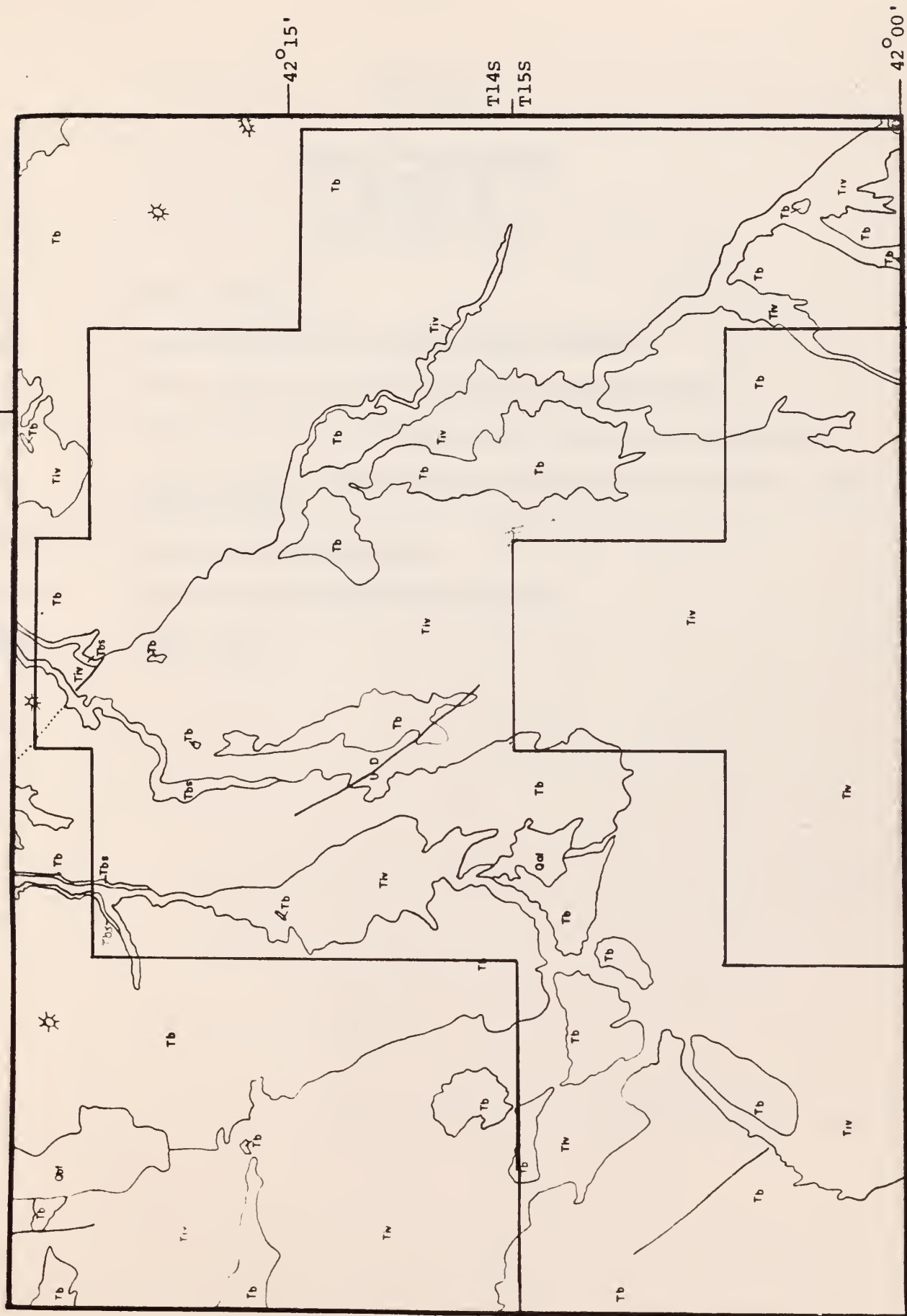
Scale 1:250,000  
(Twin Falls 1°x2° NTMS Quadrangle)







Geologic Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho










**FIGURE 2-2**  
(Continued)

**Geologic Map Legend For  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho**

- Qal - Stream Alluvium
- Qbf - Bruneau Formation: Fan gravel, cobbly to pebbly.
- Tb - Banbury Basalt: Olivine basalt altered to basaltic saprolite.
- tbs - Banbury Basalt: Sand and pebble gravel, with silt, clay, and diatomite.
- Tiv - Idavada Volcanics: Silicic latite; devitrified welded tuffs and minor inter-bedded sediments.
-  - Fault (dashed where inferred).
-  - Geologic contact (dashed where inferred).
-  - Volcanic Vent.



## 2.2.1 Geomorphology

The South Bruneau River GRA encompasses 648 square miles in the Owyhee Upland sub-province of the Columbia Intermontane physiographic province. The Owyhee Upland is a relatively flat plateau that parallels the Snake River Plain and includes portions of Idaho, Oregon, and Nevada. The plateau is a constructional volcanic plain that slopes gradually northeast toward the Snake River Plain. In general, the area is of moderate relief, cut only by the deeply incised canyons of the Bruneau River and its tributaries. The northern part of the Owyhee Upland includes South Mountain and the Silver City Range. These peaks have elevations in excess of 8,000 feet, whereas the bulk of the surrounding basalt covered plateau stands at an elevation of about 5,500 feet.

The South Bruneau River GRA contains three WSAs; WSA 17-11, WSA 111-36A, and WSA 111-36B, that have a combined area of 92,080 acres. The study area is about 45 miles south of the Snake River. Perennial streams that drain the GRA include the Bruneau and Jarbidge Rivers and Mary's Creek. First order streams that drain into the major tributaries are all intermittent. Drainage is northward, ultimately to the Snake River. The Bruneau and Jarbidge rivers flow in canyons that are, in places, over 1,000 feet deep. These canyons are seldom more than one to two miles wide at the rim. The rims of the canyons range in elevation from 5,800 feet in the south to 4,700 feet in the north. Upland surfaces within the South Bruneau River GRA are relatively flat and contain numerous ephemeral lakes.

Total relief in the South Bruneau River GRA is about 3,110 feet. The highest point, 7,010 feet, is in the southwest corner of the area; the lowest point, 3,900 feet, is in the Bruneau River Canyon in the northern part of the GRA.

## 2.2.2 Lithology and Stratigraphy

Rocks within or west of the South Bruneau River GRA range from Paleozoic metamorphic units to the Tertiary Banbury Basalt and the Quaternary Bruneau Formation (Figure 2-2).

Paleozoic metamorphic rocks and Mesozoic intrusives comprise the Pre-Tertiary basement exposed in the Owyhee Mountains portion of the Owyhee Uplands sub-province. These rocks underlie the Castle Creek and South Mountain areas and the Silver City



Range. Paleozoic metamorphic rocks in the Silver City Range consist of quartz-biotite schists and quartzite. Quartz-biotite schists comprise the bulk of the Paleozoic rocks exposed in the Castle Creek area. The age of these units is not well known. Neill<sup>(9)</sup> suggests that the metaquartzites represent turbidite sequences that were derived from a stable Paleozoic shelf to the east. This is consistent with Newton's<sup>(10)</sup> depositional basin model (Figure 2-3) if the actual margin of the western Late Paleozoic is somewhat east of where it has been mapped, or if the metamorphic rocks in this area are Middle or Early Paleozoic. Pre-Cenozoic rocks in the South Mountain area compose a sequence of schists, quartzites, and marbles that are over 3,000 feet thick. These occur as roof pendants and xenoliths in Late Mesozoic and Cenozoic intrusive masses. Paleozoic intrusives in the South Mountain area include gray, locally gneissic, biotite-hornblende-quartz diorite and granodiorite<sup>(11)</sup>. Aplite and pegmatite dikes and a large mass of hornblende gabbro also are exposed. Intrusives in the Silver City Range are dominantly biotite granodiorite with lesser amounts of quartz monzonite, granite, and alaskite. This Paleozoic assemblage is not exposed in the South Bruneau River GRA; however, similar rocks may occur at depth beneath the Tertiary cover. Volcanic rocks equivalent to the Challis Volcanics are the oldest Tertiary rocks in the Owyhee Upland. They consist of compound cooling units of densely welded rhyodacitic tuff up to 1,000 feet thick.

The bulk of the rocks in the Owyhee Upland resulted from bimodal rhyolite-basalt Miocene volcanism. In the Idaho and Oregon portions of the Owyhee Upland, the Miocene volcanics are divided into three major sequences: a lower basalt sequence, a middle silicic sequence, and an upper basalt sequence. The lower basalt sequence consists of latite and alkaline olivine basalt flows whose aggregate thickness is up to several thousand feet. The latite and basalt occur as thin, vesicular, interbedded flows that unconformably overlie the Pre-Tertiary basement. This lower basaltic unit is the same age as the Columbia River basalt group; however, it is much more alkaline than the Columbia River basalt group.

The middle silicic sequence, also known as the Idavada Volcanics<sup>(7)</sup>, composes a large volume of ash-flow tuffs and ignimbritic units that underlie most of the Owyhee Upland. Oldest of these is the Silver City rhyolite, a compound cooling unit of remobilized, densely welded tuffs that are up to 600 feet thick. The Silver City rhyolite is followed by units from the Juniper Mountain volcanic center that include the tuff of Swisher Ridge, the Badland tuff, and interbedded tuffaceous sandstones and siltstones. Younger Miocene silicic flows in the Owyhee Upland include flow-layered and flow-banded





rhyolites and tuffs of Duck Valley, Black Mountain, Browns Creek, and Little Jacks Creek.

The upper basalt sequence comprises the wide-spread flows of the Banbury Basalt. The Banbury Basalt sequence contains many thin flows of fine-grained, vesicular, alkaline-olivine basalt and minor interbedded sedimentary units. The sedimentary units contain basalt clasts, tuffaceous sands and gravels, and Quaternary ashy-diatomite beds. The Bruneau Formation is primarily composed of fanglomeratic sediments in this area.

### 2.2.3 Structural Geology

Structural information in the South Bruneau River GRA is minimal due to the amount of Tertiary cover. Lineaments of Basin and Range origin have been interpreted from LANDSAT imagery and topographic maps by Schlicker<sup>(12)</sup> specifically for this project. The origin of these linears and arcuates and the nature of the Pre-Tertiary basement is unknown. Cretaceous intrusive bodies and associated mineralization occur at a considerable distance to the west of the GRA. Cretaceous rocks are not exposed within the GRA.

Paleozoic metasedimentary rocks near the GRA present an enigma. If the northeast trending Antler orogenic belt extends to the margin of the Idaho Batholith, then virtually all of the Owyhee Upland would have been above sea-level during the Late Paleozoic<sup>(10)</sup>. Therefore, the Paleozoic units of undetermined age that occur near South Mountain would have to be Early Paleozoic. Conversely, if the Antler orogenic belt takes a more easterly trend in southern Idaho, it is conceivable that these units could be part of the western Late Paleozoic assemblage.









FIGURE 2-3  
Paleogeographic Map<sup>(10)</sup>  
Oregon-Idaho-Nevada  
Tri-State Area





The estimation of the potential for oil and gas in several GRAs in the Owyhee Upland is affected, at least in part, by this problem. The presence of Late Paleozoic petroleum host rocks would enhance the oil and gas potential of the study area. Newton<sup>(10)</sup> suggests that the area was affected by the Antler and subsequent Sonoma orogenies, and is void of Late Paleozoic units. By Late Devonian time, the Antler Orogeny developed along a north-northeast trending swath through northwest Elko County, Nevada, and on into southwestern Idaho. The South Bruneau River GRA may lie near the axis of the Antler orogenic belt. As a direct result of the Antler orogenic uplift, a Pennsylvanian clastic wedge developed along the margins of the uplift. The orogeny culminated in a period of extensive thrust faulting that includes the Roberts' Mountain thrust south of the GRA.

The Sonoma Orogeny occurred during the Permian in north-central Nevada<sup>(10)</sup>. This deformational episode included more thrust faulting, which further complicates the interpretation of the structural geology of this area.

A tremendous increase in volcanic activity occurred in the tri-state area during the Late Cenozoic. This is recorded by the large volume of Tertiary extrusives that blanket the area. The influence of Late Cenozoic Basin and Range block-faulting is not well known in the South Bruneau River GRA. Faults that occur in the area may be related to subsidence of the Snake River basin to the north.

#### **2.2.4      Paleontology**

The South Bruneau River GRA has an overall low potential for paleontological resources. Tertiary fossil assemblages may occur in sedimentary facies of the Idavada Volcanics and Banbury Basalt. These assemblages could consist of mammalian, fish, and land plant fossils in minor lacustrine units<sup>(13)</sup>.

#### **2.2.5      Historical Geology**

Pre-Tertiary basement rocks that occur west of the South Bruneau River GRA consist of Paleozoic metamorphic rocks and Mesozoic intrusives. They are exposed in the Silver City Range, at South Mountain and in the Castle Creek areas of the Owyhee Uplands. Paleozoic structural evolution of the Owyhee Upland is not well known. There are no contiguous exposures of Paleozoic lithologies due to the overlying Tertiary deposits.



Therefore, the position of the Owyhee Upland relative to the Paleozoic Antler orogenic belt is not fully understood. A few exposures of Paleozoic turbidite sequences suggest that the Owyhee Upland area was part of the western Late Paleozoic eugeoclinal depositional basin (Figure 2-3, above). Mesozoic intrusive activity has affected parts of the province. This intrusive activity is associated with minor metallic mineralization west of the GRA. Intrusives in the South Mountain area have radiometric ages between 87 million years<sup>(14)</sup> and 45.2 million years<sup>(11)</sup>.

The oldest Tertiary rocks in the province are equivalents of the Eocene Challis Volcanics. They form an extensive sequence in the vicinity of Poison and Castle Creeks. The Challis Volcanics have been dated at 43.6 million years<sup>(9)</sup>.

During Miocene time the Owyhee Upland sub-province was subjected to Basin and Range-type extensional faulting that was accompanied by bimodal rhyolite-basalt volcanism. The Miocene bimodal volcanic rocks form the bulk of the rocks in the Owyhee Upland. In Idaho, they are divided into three subunits; an older basaltic sequence, a middle unit composed of silicic flows and tuffs, and a younger basaltic sequence that is equivalent to the rocks in the adjacent Snake River Plain<sup>(2)</sup>.

## **2.3 ENVIRONMENTS FAVORABLE FOR GEM RESOURCES**

The South Bruneau River GRA contains one environment that is moderately favorable for potential geothermal resources<sup>(18)</sup>. This environment occurs in two subareas within the GRA. The areas have been delineated on the basis of known occurrences of hot springs and associated major faults. Although the environment favorable for geothermal resources is fault-related, there is no available evidence that allows the projection of this environment beneath the adjacent Tertiary cover. The area contains no environments that exhibit favorable characteristics for other GEM resources.

### **2.3.1 Environments for Metals Resources**

The entire South Bruneau River GRA is underlain by un-mineralized volcanic and volcanoclastic rocks<sup>(16)</sup>. Occurrences of metallic mineralization are not known in the area. The potential for mineralization in this area is rated very low by Bennett (personal communication, 1982). Recognition criteria for environments favorable for the accumulation of metallic resources are not present. However, sub-surface data are







notably lacking.

### **2.3.2      Environments for Oil and Gas Resources**

The South Bruneau River GRA is unfavorable for the occurrence of oil and gas resources. Only a small portion of the southwesternmost part of the GRA currently is leased or under lease application for oil and gas. The area is within the boundaries of Miocene Humboldt and Bruneau Lakes. There is no direct evidence, however, that these environments are favorable for potential oil and gas resources<sup>(10)</sup>. Favorable Late Paleozoic and Mesozoic environments probably do not exist in the area.

### **2.3.3      Environments for Oil Shale and Tar Sands Resources**

The South Bruneau River GRA contains no environments that exhibit favorable characteristics for the occurrence of oil shale or oil impregnated sands<sup>(17)</sup>. The area is underlain predominantly by Tertiary volcanics. Potential host rocks are largely tuffaceous and contain only minor amounts of non-volcanic clastic material. Favorable lithologies are not present.

### **2.3.4      Environments for Geothermal Resources**

Environments favorable for the occurrence of geothermal resources have been delineated solely on the basis of the occurrence of hot springs associated with known structures. Indian Hot springs (surface temperature 70°C, discharge 3,000 gallons per minute), occurs in the northern part of the South Bruneau River GRA. Murphy Hot Springs (surface temperature 50°C, discharge 35 gallons per minute), occurs in the southeastern part of the GRA<sup>(18)</sup>.

### **2.3.5      Environments for Uranium and Thorium Resources**

The South Bruneau River GRA does not contain any environments that are favorable for the occurrence of uranium or thorium deposits<sup>(19)</sup>. The GRA does not exhibit any of the lithologic, alteration, or geochemical criteria that would suggest the presence of uranium or thorium. Favorable volcanogenic environments that are analogous to those at McDermitt caldera and Virgin Valley, are not present in the study area.





### **2.3.6      Environments for Coal Resources**

The South Bruneau River GRA contains no environments favorable for the occurrence of coal and lignite deposits<sup>(15)</sup>. The chances for coal to have formed in the study area are remote. The geology of the GRA does not support the conclusion that euxinic environments favorable for the formation of coal deposits existed in the area. Much of the area either is mantled with accumulations of lavas and related volcanic products or has been modified by adjacent volcanic activity.

### **2.3.7      Environments for Industrial Minerals Resources**

The South Bruneau River GRA contains no environments favorable for industrial minerals resources. The geology and occurrences in the area do not support the probability of the existence of environments favorable for these resources.

### **2.3.8      Environments for Paleontological Resources**

Environments that are potentially favorable for the occurrence of fossiliferous strata are limited because the majority of the South Bruneau River GRA is characterized by rhyolitic tuffs, basalts, and other non-fossiliferous lithologies. No fossil localities or other direct or inferred favorable evidence exist in the study area<sup>(13)</sup>.

### **2.3.9      Environments for Geologic Hazards**

Potential geologic hazards in the South Bruneau River GRA consist of faults, landslides, and/or volcanic centers<sup>(12)</sup>. These features were noted from aerial photographs, geologic maps, and topographic maps. There is no historical record of violent seismic or volcanic activity in the area. The potential for mass movement exists along all over-steepened slopes within the GRA.

### **2.3.10     Educational and Scientific Localities**

There are no known ESLs in the South Bruneau River GRA.



### **3. ENERGY AND MINERAL RESOURCES IN THE SOUTH BRUNEAU RIVER GRA**

Parts of the South Bruneau River GRA are moderately favorable for geothermal resources. Conversely, the GRA is unfavorable for all other GEM resources.

#### **3.1 KNOWN DEPOSITS**

This area contains no known deposits of GEM resources, nor is it located in or near any known mineral belt or mining district.

#### **3.2 OCCURRENCES**

The South Bruneau River GRA contains three MILS cluster localities (Figure 3-1). These data include two geothermal records, two non-precious gemstone localities, and one mercury prospect. None of the MILS localities are within either of the of the WSAs. The GRA contains to CRIB or NURE-related localities.

#### **3.3 CLAIMS**

The South Bruneau River GRA contains 24 mining claims (Figure 3-2). The claims are probably related to the non-precious gemstone localities in the MILS data. Thirteen of the claims occur within the northern part of WSA 17-11 (T13S,R7E,Sec.33). Claims information is current as of 15 August, 1982.

#### **3.4 LEASES**

The southwestern corner of the GRA is leased or under lease application for oil and gas. Parts of T15S, T16S, and Range 4E are included in the leasing activity. A small part of WSA 11-36A is included in this area. Lease information is current as of 15 August, 1982.

#### **3.5 DEPOSIT TYPES**

There are no known deposits in the South Bruneau River GRA.



FIGURE 3-1

MILS Localities Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho

25

x = Site Keyed to Explanation

25  
x

11  
x

3  
x

This map is an overlay for Figures 2-1 and 2-2.

Scale 1:250,000  
(Twin Falls 1°x2° NTMS Quadrangle)





**FIGURE 3-1**  
(Continued)

**Explanation Of The  
MILS Localities Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho**

3

3 NAME- MURPHY HOT SPRING REFERENCE NUMBER- 0160730374  
STATE- IDAHO COUNTY- OWYHEE ELEV:PREC- 1554M: 10M  
LATITUDE- N 42 02 00 PRECISION- 10M  
LONGITUDE- W 115 22 00 REFERENCE POINT- ORE BODY  
UTM: ZONE 11N NORTHING 4654554 EASTING 635203  
PUBLIC LAND SURVEY TOWNSHIP- 016 S RANGE- 003 E  
DESCRIPTION SECTION- 24 SECTION SUBDIVISION- NW  
RIVER BASIN- DOMAIN- PRIVATE  
STATUS- PRODUCER OPERATION TYPE- WELL  
MESA ID NO. YEAR FIELD CHECKED- 1973 MAP REPOSITORY- FOC  
MAP NAME- TWIN FALLS TYPE- 1:250K  
1:250,000 MAP NAME- TWIN FALLS MINERAL PROPERTY FILE-  
PRIMARY NAME- MURPHY HOT SPRING  
COMMOD/MOD- GEOTHERMAL  
BRUNEAU RIVER WILD SCENIC STUDY

12

11 NAME- IMPERIAL MERCURY REFERENCE NUMBER- 0160730377  
STATE- IDAHO COUNTY- OWYHEE ELEV:PREC- 1554M: 10M  
LATITUDE- N 42 10 30 PRECISION- 10M  
LONGITUDE- W 115 45 00 REFERENCE POINT- TRENCH  
UTM: ZONE 11N NORTHING 4609748 EASTING 603241  
PUBLIC LAND SURVEY TOWNSHIP- 015 S RANGE- 008 E  
DESCRIPTION SECTION- 03 SECTION SUBDIVISION-  
RIVER BASIN- DOMAIN- BLM ADMIN  
STATUS- EXP PROSPECT OPERATION TYPE- SURFACE  
MESA ID NO. YEAR FIELD CHECKED- 1973 MAP REPOSITORY- FOC  
MAP NAME- TWIN FALLS TYPE- 1:250K  
1:250,000 MAP NAME- TWIN FALLS MINERAL PROPERTY FILE-  
PRIMARY NAME- IMPERIAL MERCURY  
COMMOD/MOD- MERCURY  
BRUNEAU RIVER WILD SCENIC STUDY

33

25 NAME- INDIAN HOT SPRING REFERENCE NUMBER- 0160730373  
STATE- IDAHO COUNTY- OWYHEE ELEV:PREC- 1463M: 10M  
LATITUDE- N 42 20 15 PRECISION- 10M  
LONGITUDE- W 115 39 00 REFERENCE POINT- ORE BODY  
UTM: ZONE 11N NORTHING 4087918 EASTING 611215  
PUBLIC LAND SURVEY TOWNSHIP- 012 S RANGE- 007 E  
DESCRIPTION SECTION- 33 SECTION SUBDIVISION- SW  
RIVER BASIN- DOMAIN- PRIVATE  
STATUS- RAW PROSPECT OPERATION TYPE- MINERAL LOC  
MESA ID NO. YEAR FIELD CHECKED- 1973 MAP REPOSITORY- FOC  
MAP NAME- TWIN FALLS TYPE- 1:250K  
1:250,000 MAP NAME- TWIN FALLS MINERAL PROPERTY FILE-  
PRIMARY NAME- INDIAN HOT SPRING  
COMMOD/MOD- GEOTHERMAL  
BRUNEAU RIVER WILD SCENIC STUDY







**FIGURE 3-1**  
(Concluded)

**Explanation Of The  
MILS Localities Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho**

34  
25 NAME- INDIAN HOT SPRING JASPER REFERENCE NUMBER- 0160730376  
STATE- IDAHO COUNTY- OWYHEE ELEV:PREC- 1453M: 10M  
LATITUDE- N 42 20 15 PRECISION- 10M  
LONGITUDE- W 115 39 00 REFERENCE POINT- ORE BODY  
UTM: ZONE 11N NORTHING 4687918 EASTING 611215  
PUBLIC LAND SURVEY TOWNSHIP- 012 S RANGE- 007 E  
DESCRIPTION SECTION- 33 SECTION SUBDIVISION-  
RIVER BASIN- DOMAIN- BLM ADMIN  
STATUS- PRODUCER OPERATION TYPE- SURFACE  
MESA ID NO. YEAR FIELD CHECKED- 1973 MAP REPOSITORY- FOC  
MAP NAME- TWIN FALLS TYPE- 1:250K  
1:250,000 MAP NAME- TWIN FALLS MINERAL PROPERTY FILE-  
PRIMARY NAME- INDIAN HOT SPRING JASPER  
OTHER NAMES- BRUNEAU GROUP JASPER  
COMMOD/MOD- GEMSTONE NONPRECIOUS  
BRUNEAU RIVER WILD SCENIC STUDY

35  
25 NAME- UNNAMED REFERENCE NUMBER- 0160730363  
STATE- IDAHO COUNTY- OWYHEE ELEV:PREC- 1463M:500M  
LATITUDE- N 42 20 30 PRECISION- 500M  
LONGITUDE- W 115 39 35 REFERENCE POINT- ORE BODY  
UTM: ZONE 11N NORTHING 4688367 EASTING 610407  
PUBLIC LAND SURVEY TOWNSHIP- 012 S RANGE- 007 E  
DESCRIPTION SECTION- 33 SECTION SUBDIVISION-  
RIVER BASIN- 17A ROLLING FORK SALT RIVER DOMAIN- BLM ADMIN  
STATUS- PRODUCER OPERATION TYPE- SURFACE  
MESA ID NO. YEAR FIELD CHECKED- 1973 MAP REPOSITORY- FOC  
MAP NAME- TWIN FALLS TYPE- 1:250K  
1:250,000 MAP NAME- TWIN FALLS MINERAL PROPERTY FILE-  
PRIMARY NAME- UNNAMED  
COMMOD/MOD- GEMSTONE





FIGURE 3-2

Claims Density Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho

N

6  
13 1

3

n = number of claims per section

This map is an overlay for Figures 2-1 and 2-2.

1

Scale 1:250,000  
(Twin Falls 1°x2° NTMS Quadrangle)





### 3.6 MINERAL ECONOMICS

The South Bruneau River GRA is classified as being moderately favorable for the occurrence of potential geothermal resources.

#### 3.6.1 Geothermal

Geothermal resources may be classified into two general categories; low-temperature resources (96°F to 196°F), and high-temperature resources (196°F to 302°F). Uses of low-temperature geothermal resources include local industrial, agricultural, and domestic heating applications. High-temperature geothermal resources currently are used only in limited commercial electrical generation and research applications. Supply, demand, and price data are not established for this resource because of the limited amount of production. The importance of geothermal resources is generally of a local nature<sup>(18)</sup>.

### 3.7 STRATEGIC AND CRITICAL MINERALS AND METALS

The South Bruneau River GRA is not favorable for any of the strategic and critical minerals listed in the BLM compilation given in Table 3-4 of the TERRADATA report entitled "Procedures for the Assessment of Geology, Energy, and Minerals (GEM) Resources."





#### 4. CLASSIFICATION OF LAND FOR GEM RESOURCES POTENTIAL

The precise location of specific favorable environments within a given GRA depends upon three principal factors:

- o The precision and specificity of available data;
- o The nature (size and spatial distribution) of anticipated deposits as predicted from known models; and
- o The geometry of the favorable geologic environments.

Commodity-specific information in the South Bruneau River GRA is limited. Sub-surface information is virtually non-existent. Therefore, with the exception of geothermal resources, the entire area, rather than specific subareas, has been classified for individual GEM resources (Figure 4-1 and Table 4-1)

Areas labeled 1-3A and 2-3A in the north and southeast parts of the GRA are considered moderately favorable (Class 3) for geothermal resources because the inferred geologic processes and reported mineral occurrences indicate the presence of potential resources. The level of confidence (A) assigned to this classification signifies that the available data, in the form of low-temperature occurrences, provide indirect evidence to support the evaluation<sup>(18)</sup>.

All other areas within the South Bruneau River GRA do not exhibit characteristics that are favorable for the occurrence of any other GEM resources.

TERRADATA's evaluation of the South Bruneau River GRA for leasable commodities agrees with the USGS evaluation of the area for the same commodities, with the exception of oil and gas<sup>(20, 21, 22)</sup>. The USGS includes the South Bruneau River GRA in a broad area of southern Idaho that is considered potentially favorable for oil and gas in southern Idaho. The probable lack of Late Paleozoic and Cenozoic marine strata, paired with nearby volcanism make it unlikely that petroleum resources exist in this area.





FIGURE 4-1

Land Classification Map  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho

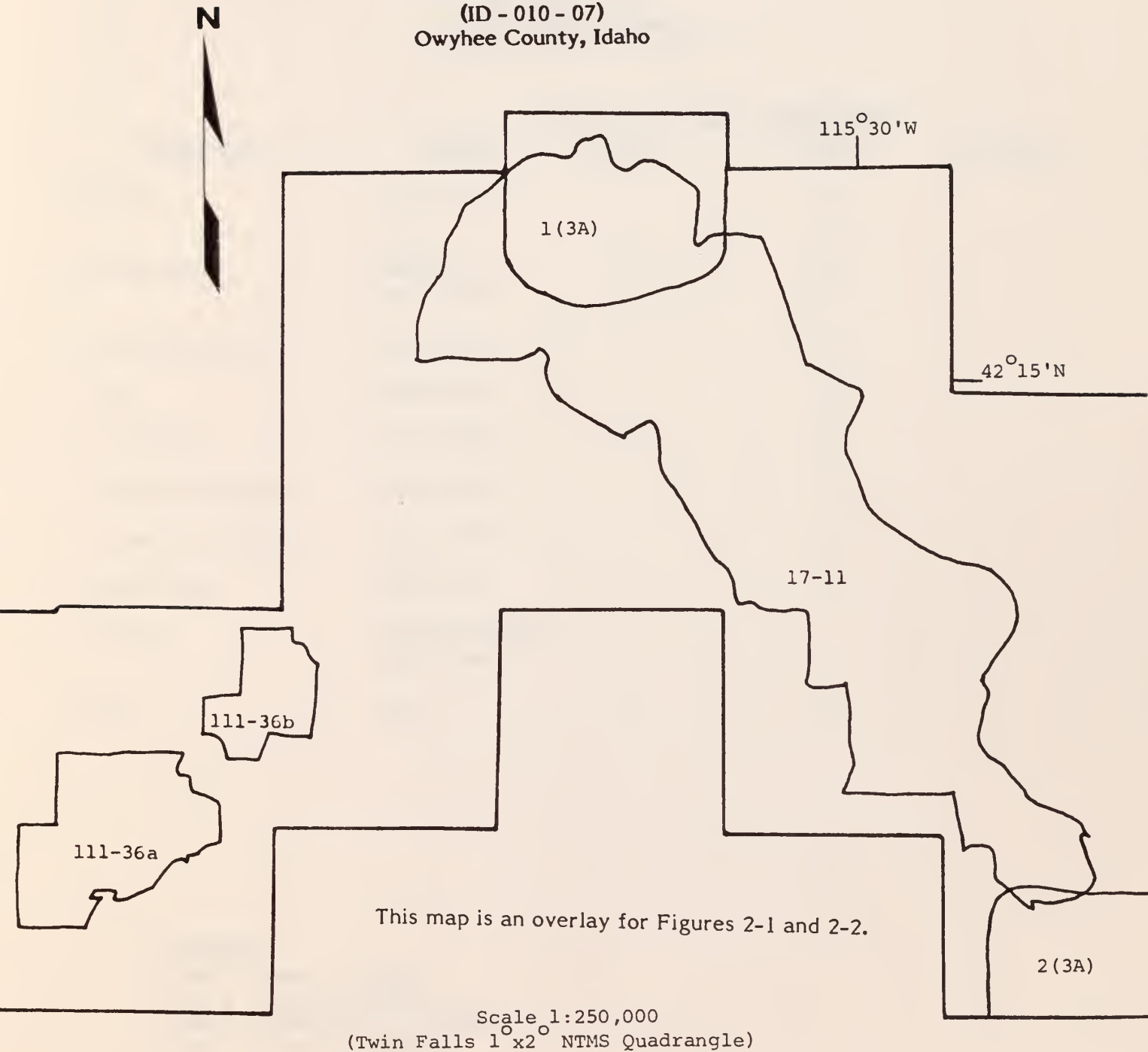




TABLE 4-1

Classification Of Lands Within The  
South Bruneau River GRA  
(ID - 010 - 07)  
Owyhee County, Idaho  
For GEM Resource Potential

<u>COMMODITY</u>	<u>AREA</u>	<u>CLASSIFICATION LEVEL</u>	<u>CONFIDENCE LEVEL</u>	<u>REMARKS</u>
Metals	Entire GRA	1	B	
Geothermal	Area 1-3A	3	A	
	Area 2-3A	3	A	
	Rest of GRA	1	B	
Uranium/Thorium	Entire GRA	1	A	
Coal	Entire GRA	1	C	
Oil and Gas	Entire GRA	1	B	
Tar Sands/Oil Shale	Entire GRA	1	C	
All Industrial Minerals	Entire GRA	1	A	
Paleontology	Entire GRA	1	A	
Hazards	See Hazards Map (GRA File)			
ESLs	None	1	C	

**LEGEND:**

Class 1 - Least Favorable  
Class 2 - Low Favorability  
Class 3 - Moderate Favorability  
Class 4 - High Favorability

Confidence Level A - Insufficient data or no direct evidence  
Confidence Level B - Indirect evidence available  
Confidence Level C - Direct evidence but quantitatively minimal  
Confidence Level D - Abundant direct and indirect evidence





## 5. RECOMMENDATIONS FOR FUTURE WORK

Further surface geologic investigations, including detailed mapping and stratigraphic studies, could enhance the confidence levels of many of the classifications in the South Bruneau River GRA. It is doubtful, however, that the original classifications would change substantially. Sub-surface investigations are probably not warranted in this area due to the costly nature of the available methods. Geophysical and geochemical surveys might provide some insight into the potential resources in the study area.





**- APPENDIX A -**

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